

CLAIMS

In the claims:

1. A method for segmenting a target image from an ambient image, comprising:
categorizing the ambient image into a plurality image regions on the basis of image constancy; and
combining a subset of the image regions together into the target image in accordance with a predefined combination heuristic.
2. The method of claim 1, wherein the ambient image is the latest image in a sequence of ambient images.
3. The method of claim 1, wherein the target image includes characteristics of a human occupant in a vehicle, and wherein the target image is used to make deployment decisions for a safety restraint application in the vehicle.
4. The method of claim 1, further comprising removing a subset of areas from the ambient image that are not of interest.
5. The method of claim 4, wherein the subset of areas are removed from the ambient image before the categorization of the ambient image.
6. The method of claim 4, wherein areas of the ambient image that are substantially identical in a series of ambient images are removed from the ambient image.
7. The method of claim 1, further comprising calculating parameter values describing image constancy.
8. The method of claim 7, wherein the parameter values include at least one of a color value, a texture value, and a grayscale value.

9. The method of claim 7, wherein an expectation-maximization heuristic calculates the parameter values.
10. The method of claim 1, wherein the categorizing of the ambient image includes filtering the image regions to remove noise.
11. The method of claim 1, wherein the categorizing of the ambient image includes ignoring image regions smaller than a predetermined threshold.
12. The method of claim 1, further comprising storing information relating to at least two of a centroid location, a number of pixels, a maximum coordinate value, and a minimum coordinate value.
13. The method of claim 1, further comprising identifying the locations of some image regions on a graph.
14. The method of claim 1, further comprising selectively removing image regions on the basis of the location characteristics relating to the removed image regions.
15. The method of claim 1, wherein the predefined combination rule includes trying every possible combination of combined image regions that have not previously been excluded.
16. The method of claim 1, further comprising classifying the subset of image regions.
17. The method of claim 16, further comprising calculating a probability associated with the particular classification.
18. The method of claim 16, wherein an underlying data distribution is not assumed.

19. The method of claim 16, wherein a Parzen Window-based heuristic is performed to classify the subset of image regions.
20. The method of claim 16, wherein a k-nearest neighbor heuristic is invoked to classify the subset of image regions.
21. A method for segmenting a target image from an ambient image in a sequence of images, comprising:
- identifying areas of interest in the ambient image;
 - estimating parameters representing image constancy for the areas of interest;
 - selectively grouping pixels in the areas of interest into image regions on the basis of the estimated parameters representing image constancy;
 - defining the relative locations of the image regions; and
 - selectively combining image regions together into the target image.
22. The method of claim 21, wherein the ambient image is an interior vehicle area that includes an occupant, and wherein the target image includes the upper torso of the occupant.
23. The method of claim 21, further comprising classifying the target image without assuming an underlying distribution.
24. The method of claim 21, creating a histogram of estimated parameters to selectively group pixels into image regions.
25. The method of claim 21, further comprising removing image regions from subsequent processing on the basis of size.
26. An image processing system for use with the safety restraint application of a vehicle, comprising:
- a segmentation subsystem, including an ambient image, and a plurality of image regions, wherein said segmentation subsystem provides for the identification of said plurality of image regions from said ambient image; and

a classification subsystem, including a segmented image, wherein said segmentation subsystem provides for the selective combination of a subset of image regions into said segmented image.

27. The system of claim 26, further comprising an analysis subsystem, said analysis subsystem including an occupant characteristic, wherein said analysis subsystem provides for the capture of said occupant characteristic from said segmented image, and wherein said analysis subsystem provides for the transmission of said occupant characteristic to the safety restraint system of the vehicle.

28. The system of claim 27, wherein said occupant characteristic is an occupant classification.

29. The system of claim 26, further comprising a plurality of pixels, wherein said ambient image includes said plurality of pixels, and wherein said system provides for the removing of a subset of pixels in said ambient image from consideration as pixels in said segmented image.

30. The system of claim 29, wherein the removed subset of pixels are not identified as belonging to a region of interest.

31. The system of claim 29, wherein the removed subset of pixels are associated with at least one said image region selectively identified by comparison with a size threshold.

32. The system of claim 29, wherein an exterior first heuristic is performed to remove the subset of pixels.

33. The system of claim 26, said segmentation subsystem further including a plurality of parameter types and a plurality of parameter values, wherein said parameter values associated with said parameter types are used to categorize a plurality of pixels within an ambient image into said plurality of image regions.

34. The system of claim 33, wherein said classification subsystem performs an expectation-maximization heuristic using said parameter values.
35. The system of claim 33, said classification subsystem further including a histogram of said pixels and said parameter values.
36. The system of claim 33, said classification subsystem further including a representation comprising a plurality of image region locations, wherein said classification subsystem uses said representation to facilitate the selective combination of said subset of image regions into said segmented image.
37. The system of claim 26, wherein said classification subsystem includes a classification heuristic that does not assume an underlying distribution.
38. The system of claim 37, wherein the classification heuristic is one of a Parzen Window heuristic and a k-nearest neighbor heuristic.
39. The system of claim 26, wherein said occupant characteristic relates to the location of the upper torso of the occupant.
40. The system of claim 26, wherein said occupant characteristic is used to make an at-risk-zone determination.
41. The system of claim 26, wherein said occupant characteristic is used to make an occupant type determination.